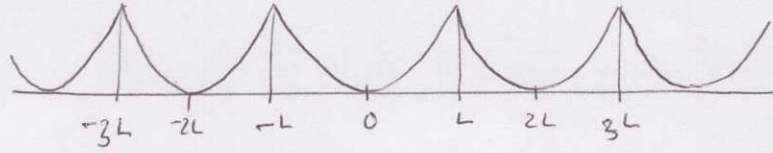


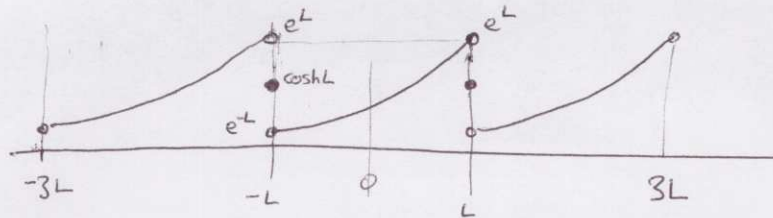
### 3.2.1 baf FS

(b)  $\cos x x^2$



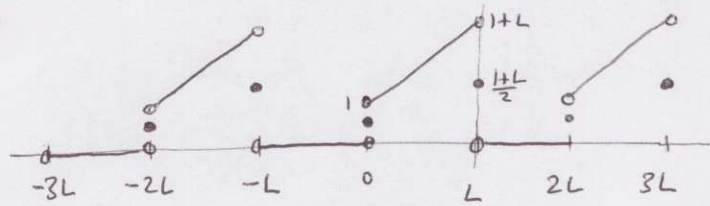
2

(d)  $e^x$



2

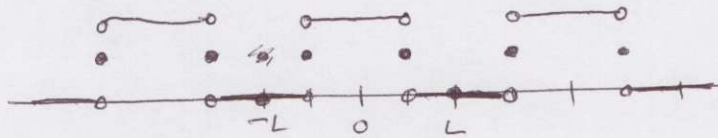
(f)  $\begin{cases} 0, & x < 0 \\ 1+x, & x > 0 \end{cases}$



2

### 3.2.2e

$\begin{cases} 1, & |x| < \frac{L}{2} \\ 0, & |x| > \frac{L}{2} \end{cases}$



2

$$A_n = \frac{1}{L} \int_{-L}^L f(x) \cos \frac{n\pi x}{L} dx = \frac{1}{L} \int_{-\frac{L}{2}}^{\frac{L}{2}} \cos \frac{n\pi x}{L} dx = \frac{2}{L} \int_0^{\frac{L}{2}} \cos \frac{n\pi x}{L} dx$$

$$= \frac{2}{L} \left( \frac{L}{n\pi} \sin \frac{n\pi x}{L} \right)_0^{\frac{L}{2}} = \frac{2}{n\pi} \sin \frac{n\pi}{2} = \begin{cases} 0 & n \text{ even} \\ \frac{2}{n\pi}, & n=1, 5, 9, \dots \\ -\frac{2}{n\pi}, & n=3, 7, 11, \dots \end{cases}$$

$$A_0 = \frac{1}{2L} \int_{-L}^L f(x) dx = \frac{L}{2L} = \frac{1}{2}$$

$$B_n = \frac{1}{L} \int_{-L}^L f(x) \sin \frac{n\pi x}{L} dx = 0 \quad (\text{odd integrand}) \quad \forall n.$$

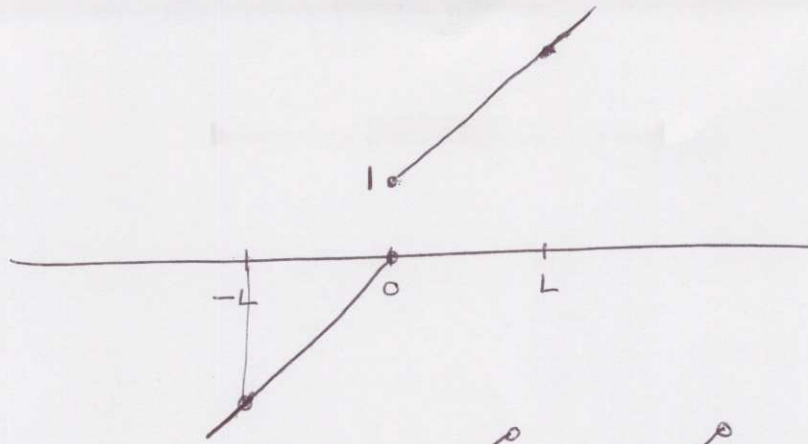
4

$$f(x) \sim \frac{1}{2} + \frac{2}{\pi} \cos \frac{\pi x}{L} - \frac{2}{3\pi} \cos \frac{3\pi x}{L} + \frac{2}{5\pi} \cos \frac{5\pi x}{L} - \frac{2}{7\pi} \cos \frac{7\pi x}{L} + \dots$$

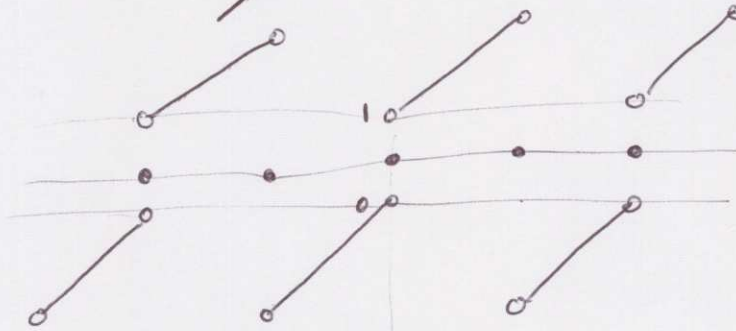
3.2.4  $\frac{f(L^-) + f(L^+)}{2}$  1

3.3.1c

f

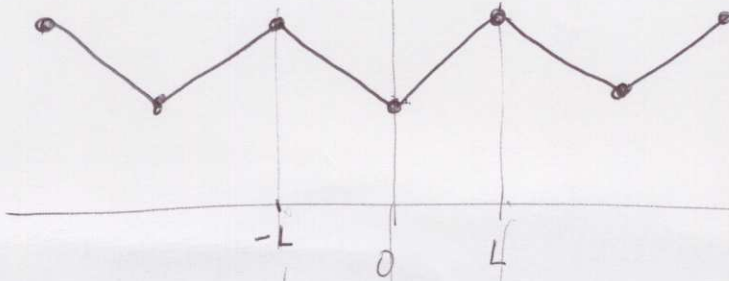


FS



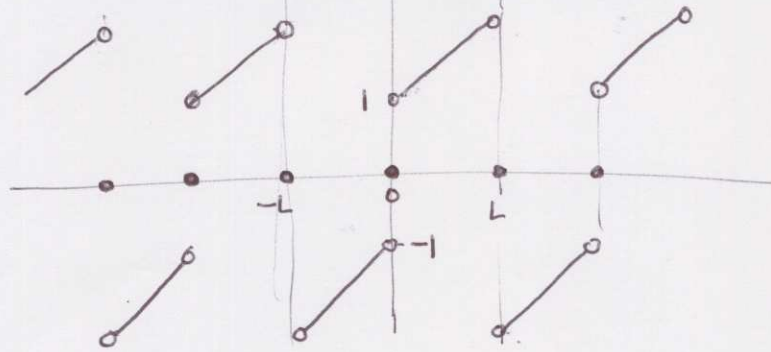
2

FCS



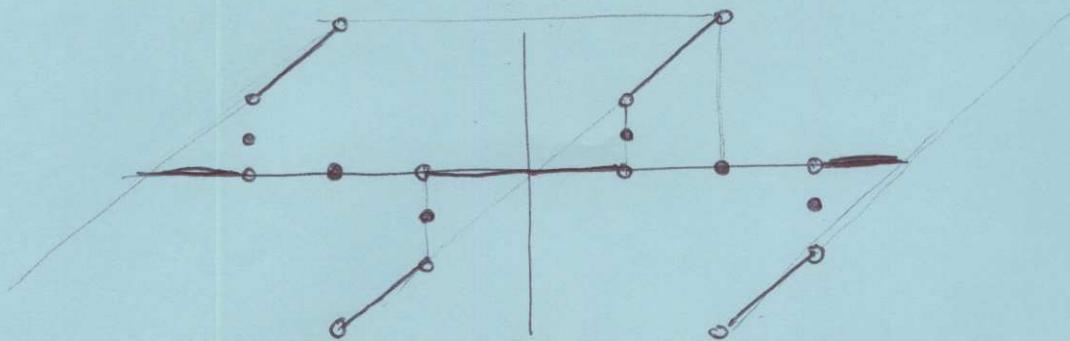
2

FSS



2

$$3.3.2c \quad f(x) = \begin{cases} 0 & x < \frac{L}{2} \\ x & x > \frac{L}{2} \end{cases}$$



$$B_n = \frac{2}{L} \int_0^L f(x) \sin \frac{n\pi x}{L} dx$$

$$= \frac{2}{L} \int_{\frac{L}{2}}^L x \sin \frac{n\pi x}{L} dx$$

$$= \frac{2}{L} \left[ \frac{L^2}{n^2\pi^2} \sin \frac{n\pi x}{L} - \frac{Lx}{n\pi} \cos \frac{n\pi x}{L} \right]_{\frac{L}{2}}^L$$

$$= \frac{2}{L} \left[ \left( 0 - \frac{L}{n\pi} \cos n\pi \right) - \left( \frac{L}{n^2\pi^2} \sin \frac{n\pi}{2} - \frac{L}{2n\pi} \cos \frac{n\pi}{2} \right) \right]$$

$$[1, 0, -1, 0, 1, \dots]$$

$$[0, +1, 0, 1, \dots]$$

$$\{B_n\} = \frac{2L}{\pi^2} \left[ \begin{array}{l} \pi \left\{ -1, \frac{1}{2}, -\frac{1}{3}, \frac{1}{4}, \dots \right\} \\ + \left\{ 1, 0, -\frac{1}{9}, 0, \frac{1}{25}, \dots \right\} \\ -\frac{\pi}{2} \left\{ 0, \frac{1}{2}, 0, \frac{1}{3}, 0, \dots \right\} \end{array} \right]$$

[4]

(check!)